(12) UK Patent Application (19) GB (11) 2 251 420 (13) A

(43) Date of A publication 08.07.1992

(21) Application No 9026946.5

(22) Date of filing 12.12.1990

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(51) INT CL[5]
B65D 81/34

(52) UK CL (Edition K)
B8C CWP3 CWS8 C203
U1S S1074

(56) Documents cited
EP 0324682 A1 US 4961944 A US 3876131 A

(58) Field of search
UK CL (Edition K) B8C CWP3 CWS8
INT CL[5] B65D 81/34
On-line database: WPI

(54) Package in which foodstuff may be heated and/or cooked

(57) A packaged foodstuff which is to be heated and/or cooked in its packaging, the packaging having at least one microperforation through which gas within the packaging can escape when the packaged foodstuff is heated. The perforation should be small enough substantialy to prevent water from entering the package when the package is heated in water, and the packaging will usually contain more than one microperforation. The invention can be used to heat packaged foodstuffs without puncturing the packaging which would otherwise allow the heating water to contaminate the foodstuff, whilst at the same time allowing air in the packages to escape without over-inflation thereof. The package may take the form of a flexible bag or pouch or a rigid or semi-rigid container. In the case of the latter two the microperforations will be situated in the flexible lid. The package may include a removable portion covering the microperforation serving to prevent the ingress and/or egress of air into the package.

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PACKAGING

This invention concerns packaging, and more particularly the packaging of foodstuffs which are to be heated and/or cooked in their packaging.

The increasing popularity of convenience foods has led to the development of packaging materials designed to facilitate the heating and/or cooking of the packaged foods. In particular, foods are packaged in containers in which the foods themselves are intended to be heated, thereby avoiding transferring the foods to another container in which the food is heated before serving. One type of packaging for this purpose consists of a flexible bag or pouch in which the food is sealed, the container and the food therein being heated, for example by placing the package in boiling water or heating it in a microwave oven. Another type of package for the purpose consists of a rigid or semi-rigid tray in which the food is sealed with a lid. As with the flexible

bags or pouches the food in the trays can be heated by placing the trays in boiling water or heating them in a microwave oven.

It will, of course, be appreciated that unless the foods have been packaged under vacuum, the packages will have to be punctured before heating, in order to prevent them rupturing when they are heated. This is especially a problem with rigid or semi-rigid trays as attempting to evacuate them can result in the trays being distorted and/or their lids being ruptured, without the evacuation being complete. Thus although the lid can often be drawn down onto the product, it cannot be drawn into the corners of the trays to exclude air therefrom. Furthermore, even though vacuum packaging of bags or pouches can remove most of the air therein as the vacuum collapses the bags or pouches onto the packaged material, they frequently contain enough residual air that they expand greatly when heated, making opening of the hot packages difficult.

Puncturing the packages presents problems when they are heated in boiling water, since although this allows air to escape from the packages as they are heated, the water used to carry out the heating tends to enter the packages, thereby mixing with the food being heated. Even if only a small hole is made in the packages, so that little if any water enters them during heating, considerable amounts of water can enter the packages through these holes for example by removing the source of heat for heating the water when the food is about to be served. This problem is particularly noticeable with rigid or semi-rigid trays, where the reduction in pressure within the packages resulting from the packages cooling cannot be compensated by the packages themselves collapsing.

According to the present invention there is provided a

packaged foodstuff which is to be heated and/or cooked in its packaging, the packaging having at least one microperforation through which gas within the packaging can escape when the packaged foodstuff is heated, said perforation being small enough substantially to prevent water from entering the package when the package is heated in water.

The present invention provides packaged foodstuffs which can be heated by boiling in water without first puncturing them, and a further advantage is that by using the appropriate materials they can alternatively be heated in a microwave oven, again without the necessity for puncturing.

The number of microperforations for any particular package of packaged foodstuff will usually be selected to allow gas within the package to escape at a rate which avoids undue expansion of the package as it is heated. In addition to the number of microperforations, their size will also affect the rate at which gas can escape through them. Although increasing the size of the microperforations can be used to increase the rate at which the gas escapes as the packages are heated, the microperforations should still, of course, be small enough substantially to prevent the ingress of water into the packages when they are heated in water. Typically, the microperforations will have a mean diameter of at least 30μm, but they usually need not be more than about 200μm. A preferred range of mean diameters for the microperforations is from 50 to 150μm, and advantageously from 75 to 120μm.

The present invention can be used with packages of various types, for example they can be flexible, e.g. in the form of bags or pouches, or more preferably they can be rigid or semi-rigid, e.g. in the form of trays. The microperforations can in general be anywhere in the

packages, but it is usually convenient that they be in a polymeric film forming at least part of the packages. In the case of bags or pouches the film can form all or only a part of the packages, while in the case of trays it is usually convenient to use a lidding film and to have the microperforations in the lid. Rigid and semi-rigid containers are generally preferred as they facilitate carrying of heated foodstuffs when they have been removed from the source of heat. Thus, apart from the presence of the microperforations, packages of the present invention can usually be substantially identical to hitherto proposed packages.

In order to maintain a sterile environment and/or a modified or controlled atmosphere within the packages of the present invention, the packages can be provided with a removable portion which exposes the microperforations when it is desired to heat them and their contents. The removable portion can be in the form of a polymeric film or a metal foil sealed over the microperforations. Of course, it is also possible to contain packaged foodstuffs in accordance with the present invention within another container which maintains the foodstuffs in a sterile state and/or in a modified or controlled atmosphere, the other container being removed when it is desired to heat and/or cook the packaged foodstuff. It will be appreciated that when rigid or semi-rigid containers are used in accordance with the invention, they are no more suitable for evacuating and packaging under vacuum than hitherto. However, foodstuffs can be packaged in them in accordance with the present invention and given an extended shelf life either by freezing, or by the use of a controlled or modified atmosphere. The present invention is particularly preferred for packages of frozen foods, where sterility is not essential for long-term storage of the food, as the containers can be heated from frozen without the removal of

a seal from the microperforations and without the necessity to puncture them.

In addition to avoiding water used to heat the packaged foodstuff from entering the packages of the present invention, it will be appreciated that the microperforations will in general also serve to prevent liquid in the foodstuff from escaping into the heating water. It will, of course, be appreciated that by their nature the microperforations will allow liquids to flow in and/or out of the containers, but in accordance with the invention this flow can be reduced while allowing gas to escape from the packages when they are heated.

The method of forming the microperforations is generally unimportant to the present invention, provided they are of a suitable size to achieve the desired purpose. In the case of microperforated polymeric films, however, it is generally convenient to produce the perforations by known methods such as the use of a high voltage spark discharge or by a laser. Perforation using needles or wires is generally not preferred as it is difficult to form sufficiently small holes that water cannot pass through them in significant amounts.

The number of microperforations per unit area of packages of the present invention should be sufficient to allow gas within the packages to escape while not allowing significant amounts of packaged foodstuff to escape therethrough or allowing significant amounts of water to enter them when they are heated in boiling water. Although in some instances a single microperforation may be adequate to achieve this, it is generally preferred to have a plurality of microperforations, for example to prevent accidental blockage, e.g. by packaged foodstuffs.

The following Example is given by way of illustration only. All parts are by weight unless stated otherwise.

Example

A 5-layer polymeric base web was produced by coextruding through a slit die a core layer of an ethylene/vinyl alcohol copolymer (EVAL - Kuraray Company) with a layer of linear medium density polyethylene (DSM4046 - DSM (UK) Ltd) on one side and a layer of a blend (1:1 by weight) of amorphous glycol-modified polyethylene terephthalate (PETG - Kodar) and a polycarbonate (PK1340 - G E Plastics) on the other, tie layers of an ethylene/maleic anhydride block copolymer being coextruded between the core layer and each of the other two layers. The core layer was approximately 15μm thick, the polyethylene layer was approximately 100μm thick, and the layer of the blend was approximately 200μm thick, with each tie layer being approximately 10μm thick.

Semi-rigid trays were then thermoformed from this 5-layer web using a Multivac form-fill-seal machine by pre-heating the film to about 180°C, and forming into a mold, the polyethylene layer forming the inner surface of the resultant trays.

A lidding film was produced by microperforating a 70μm thick coextruded film of nylon and polyethylene by spark discharge to provide the film with an oxygen permeability at 25°C of about 10000cc/m^2/day/atmosphere, the mean diameter of the microperforations being 85μm.

A single portion of a ready prepared meal was placed in one of the 5-layer trays, and the lidding film was heat sealed thereto. The packaged food was frozen in the sealed tray, and it was then heated from frozen by placing the intact tray with its lid attached into boiling water for a time

sufficient to heat the meal to the necessary temperature. Air within the package escaped through the microperforations, with only slight bulging of the lid. The heated tray was then removed from the boiling water, and the lid was opened. Since the tray remained semi-rigid when hot, it was relatively easy to carry and open whilst still hot.

Claims

1. A packaged foodstuff which is to be heated and/or cooked in its packaging, the packaging having at least one microperforation through which gas within the packaging can escape when the packaged foodstuff is heated, said perforation being small enough substantially to prevent water from entering the package when the package is heated in water.

2. A packaged foodstuff according to claim 1, wherein the packaging comprises a flexible bag or pouch.

3. A packaged foodstuff according to claim 1 or claim 2, wherein the foodstuff is maintained under vacuum within the packaging.

4. A packaged foodstuff according to claim 1, wherein the packaging comprises a rigid or semi-rigid container.

5. A packaged foodstuff according to claim 4, wherein the container has a flexible lid secured thereto.

6. A packaged foodstuff according to claim 5, wherein the lid has the at least one microperforation therein.

7. A packaged foodstuff according to any of claims 1, 2 and 4 to 6, wherein the foodstuff is held in a controlled and/or modified atmosphere within the packaging.

8. A packaged foodstuff according to any of the preceding claims, wherein the packaging includes a removable portion covering the said at least one microperforation, the removable portion serving to prevent the ingress and/or egress of air into the

packaging before it is removed but allowing gas within the packaging to escape therefrom after it has been removed and the package is heated.

Patents Act 1977
Examiner's report to the Comptroller under Section 17 (The Search Report)

Application number

9026946.5

Relevant Technical fields

(i) UK Cl (Edition K) B8C (CWP3, CWS8)

(ii) Int Cl (Edition 5) B65D (81/34)

Search Examiner

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Databases (see over)

(i) UK Patent Office

(ii) ONLINE DATABASES: WPI

Date of Search

16 MARCH 1992

Documents considered relevant following a search in respect of claims 1-8

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
XY	EP 0324682 A1 (BARILLOT) see figure 1; microperforating 41 and 42	1,3,4,5, 6,7
X	US 4961944 A (MATOBA) see figures 1(a), 1(b) and 11	1,2,4,5, 6
Y	US 3876131 A (TOLAAS) see figure 2; removable tab 33 over perforations 31	8

Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&c Member of the same patent family, corresponding document.

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